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Southern Pine BEETLE NEWS

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Southern Pine Beetles Double Food and Cover for Wildlife

While the southern pine beetle is destroying timber for people's homes, it is creating better homes for wildlife. Infestations open the forest canopy, allowing in sunshine for plant food growth and for improved animal habitats.

An acre of SPB spots yields more than twice as much forage as an acre of undisturbed forest. Dense pine plantations have little forage, so tree destruction in these areas has a larger impact than in pine-hardwood forests. SPB infestations force removal of some pines and increase the number of fruit-bearing plants and browse—the current year's growth of woody plants. The number and variety of plant species increase within the edge, an area between the infestation and the surrounding forest.

Benefiting from the additional food and cover in SPB infestations and in edges are rabbits, deer, small mammals, woodpeckers, quail, and other birds, such as owls, hawks, and songbirds. Turkeys and squirrels eat nuts and rarely live in pine plantations, so these species are unaffected by SPB attacks.

The beetle's impact on wildlife was greatly diminished in the studied area by the small size and infrequency of SPB infestations. Conclusions in this analysis were general, so the authors recommended further investigations of SPB impacts on specific wildlife species in other geographic areas.

MAINE, J. D., W. A. LEUSCHNER, and A.R. TIPTON.
1980. A qualitative analysis of the southern pine beetle's wildlife impact. Va. Polytech. & State Univ., Sch. For. & Wildl. Res. Publ. FWS-1-80, 50 p. Va. Polytech. & State Univ., Blacksburg.

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Foraging by Woodborers Causes Beetle Death

By using a forager as an example, investigators estimated how mortality agents affect southern pine beetle populations. The southern pine sawyer, *Monochamus titillator,* limits the amount of food available to developing SPB larvae. The sawyer larvae are larger and more mobile in the inner bark than the beetle.

In determining SPB mortality, researchers sampled within-tree populations of both southern pine beetles and sawyers at the same time. They estimated the inner bark surface area used by the insects by measuring the diameter at various intervals along the infested bole. Within-tree populations were measured by collecting four 100-cm^2 bark samples at different bole heights. X-rays were used to determine the extent of foraging of SPB-infested bark by sawyer larvae.

Researchers found that sawyer larvae could obtain and use the inner bark better than the SPB could. As a result, fewer southern pine beetles survived in foraged areas of the disk samples than in nonforaged areas.

COULSON, R. N., P. E. PULLEY, and L. J. EDSON.

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SJ-0710

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Changes in Tree Moisture Retard Development of SPB Larvae

"Haste makes waste" even for the southern pine beetle. In its eagerness to attack, the beetle triggers changes in the tree's phloem and outer bark. These changes may favor or retard brood development and survival.

Researchers in east Texas discovered that infested pines had the elongated SPB galleries associated with pine death and prolonged beetle development. To test whether changing tree conditions affected beetle development and survival, researchers baited loblolly pines with a bettle attractant and placed infested bark beneath the trees. Bark samples were taken at four heights for several weeks, and beetles were collected from emergence traps. Average attack density and gallery length were estimated, and the numbers of beetles in different life stages were determined. Average bark, phloem, and xylem moisture was measured to determine changes in the southern pine beetle's habitat during brood development.

Most beetles died during the larval stage, and changes in phloem moisture were greatest during this stage. The phloem began to dry immediately after beetle attack and continued to dry until the SPB moved to the outer bark. Similar changes in phloem moisture did not occur in noninfested trees.

Development of eggs and recently hatched larvae were unaffected by phloem drying. Apparently, drying of the phloem was not severe enough to slow development of these early life stages. In contrast, development of later larval stages was slow, particularly in trees with large decreases or increases of phloem moisture.

Bark moisture in infested trees changed little during beetle brood development and was not significantly different from bark moisture in noninfested trees. However, later larval stages and pupae developed slowly in the bark if their infested tree had higher than average bark moisture.

Infested trees eventually died of dehydration. The gradual penetration of fungi into the sapwood disrupted water conduction and caused an increase in water stress, leading to crown fading and tree death. Continuing transpiration accelerated this process.

WAGONER, T. L., J. A. GAGNE, P. C. DORAISWAMY, R. N. COULSON, and K. W. BROWN.
1979. Development time and mortality of *Dendroctonus frontalis* in relation to changes in tree moisture and xylem water potential. Environ. Entomol. 8:1129-1138.

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More Than 150 Insect Species Invade SPB-Infested Pines

More than 150 kinds of insects invade a single pine tree within a month after it has been attacked by southern pine beetles. Researchers in east Texas have found that the number of insect species attacking infested trees is more than twice the number of insect species attacking noninfested trees. The insects arrived when the southern pine beetle was at the appropriate stage for being preyed upon or when the tree was at the right stage for habitation.

Most adult predators, such as the clerid beetle, landed on the tree while it was under mass attack by southern pine beetles. Smaller predators capable of foraging within bark beetle galleries arrived when southern pine beetles were in egg and larval stages. Parasitic wasps were attracted to trees when the southern pine beetle was in larval and pupal stages.

Other insects arrived shortly after the tree was infested. These insects, such as engraver beetles and pine sawyers, competed for the same food source as the southern pine beetle. Scavengers and fungus feeders were attracted by the odor of tree decay, so these insects responded during the later stages of southern pine beetle brood development.

Insect distribution along the bole of the tree was affected by bark characteristics, number of

susceptible trees, and other factors. Ambrosia beetles landed on the lower bole where their fungus gardens could develop because of nearness to root systems and soil water. Most parasitic wasps were attracted to bark beetles on the upper bole, while other parasitic wasps gathered at midbole. The predators were distributed according to the abundance of their prey and habitat requirements.

DIXON, W. N., and T. L. PAYNE.
1979. Sequence of arrival and spatial distribution of entomophagous and associate insects on southern pine beetle-infested trees. Tex. Agric. Exp. Stn., Misc. Publ. 1432, 27 p. Tex. A. & M. Univ., College Station.

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Frontalure Prevents Infestation Growth

To disrupt infestation growth, researchers have been using frontalure, a southern pine beetle attractant. Host and nonhost loblolly pines were baited with frontalure in two east Texas infestations, and traps were used to catch beetles.

Before frontalure was added, 90 percent of the beetles were caught at the spreading front or active head of infestations. But after frontalure was used, trapped beetles were found to be randomly distributed throughout the infestations.

Frontalure attracted brood adults to trees within infestations and prevented the beetles from traveling to naturally attractive (newly attacked) trees at the head of infestations. Because beetles were randomly distributed within infestations instead of being concentrated at the head, not enough beetles were present at any only place to overcome new trees. As a result, no infestation growth occurred until the frontalure treatment was stopped.

The frontalure treatment also affected the movement of the clerid beetle in the same manner as the southern pine beetle. The clerid remained closely associated with its prey.

RICHERSON, J. V., F. A. MCCARTY, and T. L. PAYNE.
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Fungi, Protozoa Infect One-Fifth of Pine Beetles

Diseases appear to play an important role in regulating populations of the southern pine beetle. Fungus-caused mortality occurs most frequently during cool weather, while protozoan infections are higher during warm weather.

Researchers studied seven active SPB infestations in Mississippi and Alabama. Bark samples were taken from 175 beetle-infested loblolly, shortleaf, and longleaf pines. The samples contained 60,472 SPB eggs, larvae, pupae, and adults. Most were collected from the lower portion of the infested boles. About 62 percent of the beetles were in the larval stage, with 16 percent in the pupal stage and 21 percent in the adult stage.

More than one-fifth of the collected beetles were diseased. The most common cause of death was protozoan infection, which was at its worse from April to September. The next most common causes of mortality were nematodes (parasitic worms) and fungi. Both peaked during the cooler months of October through March. The incidence of different diseases varied among geographic locations. Disease incidence was not affected by the amount of rainfall.

Study results suggest that diseases are important in controlling Mississippi beetle populations during epidemic years, as well as during periods of low beetle activity.

SIKOROWSKI, P. P., G. S. PABST, and O. TOMSON.
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Aircraft Guidance Systems Updated in Spring Workshop

A workshop on aircraft guidance systems (Flying Flagman, Loran-C, Omega, Inertia, and Decca) was held at the Western Forest Insect Work Conference in El Paso in early March. Moderator of the session was Chuck Dull, a Southern Pine Beetle Program investigator and technology transfer team member.

Manufacturers and users of the aircraft guidance systems discussed their use in aerial applications of pesticides and fertilizers, logging operations, aerial photographic operations, and forest insect surveys. Over the past 5 years the technology of airborne equipment has been refined to provide accurate positioning information for almost unlimited use.

For more information, contact Chuck Dull, Southeastern Area State and Private Forestry, Forest Insect and Disease Management Survey Team. Write Northgate Office Park, Room 2103, 3620 Interstate 85 NE, Doraville, Ga., 30340, or call 404-221-4796.

Georgia Training Sessions Teach Stand Identification, SPB Control

Training sessions for industrial and large private landowners were offered in response to last year's southern pine beetle activity (1,146,567 cords killed) in Georgia. Fourteen sessions were conducted from Jan. 23 to Apr. 9 by Terry Price, entomologist for the Georgia Forestry Commission, Macon. The meetings emphasized setting control priorities and identifying susceptible stands.

Foresters attending the training sessions were from Armstrong Cork, Buckeye Cellulose, Burgin Lumber Co., Continental Forest Industries, Frazier and Weathersby Consultants, Georgia Kraft, Georgia Power Co., Georgia Timberlands, Georgia Pacific, Gilman Paper Co., Great Southern, Hiawassee Land Co., St. Regis, State Parks, Sullivan Lumber Co., and Union Camp.

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